

Tracts 1483. ①

ON THE  
IMPORTANCE AND PRACTICABILITY  
OF A  
STANDARD CLASSIFICATION  
OF  
IMPAIRED LIVES.



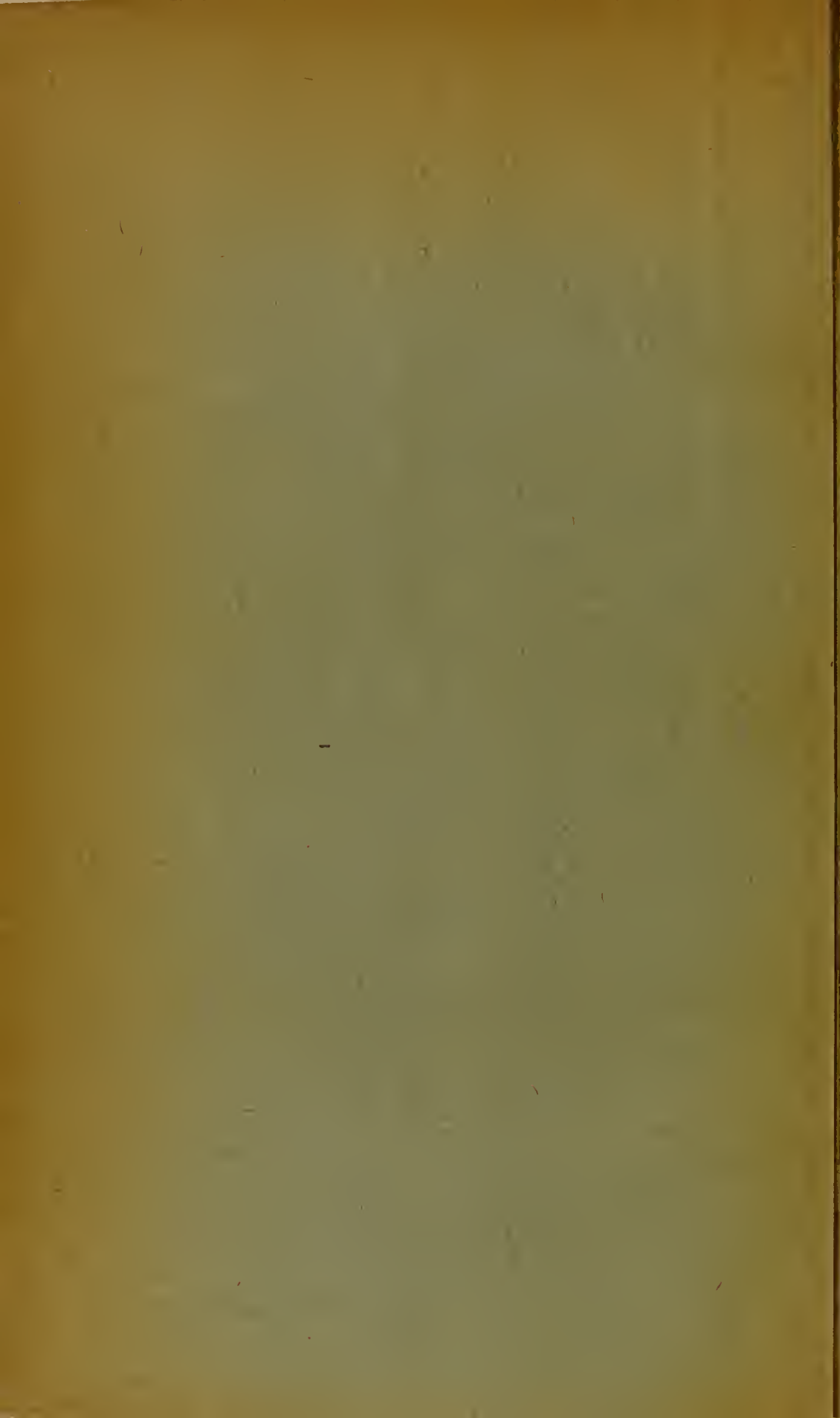
BY

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[Read before the Institute of Actuaries, 17 April 1905.]

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3. VIII. 7.

Dear Sir,

I have the pleasure to send herewith copies of three papers; as a rule one would not send copies of papers, but two of these (though upon medical subjects) appeared in non-medical publications: and the third in the reports of a Congress which may perhaps not be included in your library.

If they are of no service to you, let them go to the waste-paper basket.

I am

Yours faithfully  
S. W. Larwell

The Librarian  
R.C.S.



[*Extracted from* "THE JOURNAL OF THE INSTITUTE OF ACTUARIES",  
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## IMPORTANCE AND PRACTICABILITY

OF A

# Standard Classification of Impaired Lives.

BY

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I HAVE heard that a former distinguished President of this Institute once publicly stated that "Doctors rush in where Actuaries fear to tread." It is also said that "at forty a man is either a physician or a fool": but the presidential saying seems to suggest that a man may be both. With such a warning ringing in my ears, I yet venture to read before this learned Institute a paper on a thorny subject. I am doing so, first because that subject can be dealt with only by the united labour of actuaries and doctors; and second, because I am sure of the consideration and forbearance of the Fellows in any matters wherein I travel with halting gait.

By a "Standard Classification of Impaired Lives" I mean a system by which every office would be enabled to "pigeon-hole" (so to speak) lives with similar impairments in uniformly labelled pigeon-holes: so that at any time a collective investigation could readily be made of the contents of one or more of these pigeon-holes, with a certainty that the material contained therein was at

least sufficiently homogeneous to furnish a mortality experience of practical value.

On the importance of such a classification it is hardly necessary for me to enlarge before this Institute: I would merely like to emphasize the fact that it is deemed of prime importance by many physicians, more especially (I am bound with regret to admit) on the Continent, where perhaps medical directors as a class make a more scientific study of the medical side of insurance than is done in this island. That the need is not unfelt in Britain, however, is evident by the crisp description of it by Sir William Gowers, only a few months ago, in a paper read before the Life Assurance Medical Officers' Association. "I do not know whether the effort has yet been made by this Association, but it would be most desirable to make an attempt to secure the actual tabulation and classification of the facts of medical importance on a uniform system in every office, so that they could be ascertained for a series of years without much labour and without much time, and could be easily combined and classified. Such a scheme would be worth much trouble. It should be simple and not elaborate. But I must not pursue this subject further."

The matter had been in my mind, in somewhat nebulous form, even before May 1902: but it first took definite shape at a meeting of the Life Assurance Medical Officers' Association in that month. Dr. Hingston Fox read a suggestive paper "On the Method of making Advances in Impaired Lives": his first two conclusions were as follows: "1. A strictly scientific method of making advances in impaired lives is not at present possible. 2. An approximately true method is found by the medical examiner estimating the extent to which the expectation period is diminished by the defect present."

In the discussion which followed I ventured to make some remarks, from which I quote the following sentences: "It is important to see whether any practical issue arises out of this question. It seems to me that our radical difficulty as medical men is that we do not treat impaired lives by the same method as healthy lives. All insurance work can only be done by the doctor and the actuary in co-operation. The work of insurance, as far as it deals with healthy lives, is an absolutely mathematical work, based on facts drawn up into mortality tables. The share of the doctor in producing these has been the humble one of classification, separating the healthy from the impaired

“lives. The doctor having done that, the actuary works out the  
 “mortality tables. It seems to me that the only way in which  
 “we can face the question of impaired lives is by a similar  
 “division of the work; the doctors must classify impaired lives,  
 “and then the actuaries work out the figures. . . . We have to  
 “remember that healthy lives are a single class, while impaired  
 “lives consist of manifold classes, classes almost innumerable;  
 “and an enormous mass of statistics is necessary to give reliable  
 “results in regard to these impaired lives. . . . Dr. Hingston  
 “Fox says that ‘an approximately true method is found by the  
 “medical examiner estimating the extent to which the expectation  
 “period is diminished by the defect at present.’ . . . It seems to  
 “me that an *estimate* is not what is wanted; we want to  
 “ascertain the extent to which the expectation is diminished by  
 “the defect present. Only actuaries can do that, and they can  
 “only do it after we doctors have classified the cases for them.  
 “That leads me to the practical point. It has been said we  
 “can never get the data in our time. That may be true. Long  
 “experience is necessary. But the data will never be got unless  
 “we begin. We must have enough disinterestedness to work for  
 “posterity, and if this Association could devise some scheme for  
 “classifying extra risks, I am sure the actuaries would be  
 “very grateful; and that in England work could be done quite  
 “as good as that which has been commenced [in the Specialized  
 “Mortality Investigation] in America.”

Pardon my quoting at such length what must be to you a mere bundle of truisms. The position is elementary, but it seems to me to be fundamental. There is but one thing I would alter. In criticizing Dr. Fox, I was entrapped by his use of the expression “Expectation Period” into using it myself, instead of speaking of mortality tables, to which I had already referred in the earlier part of my remarks. Of course what we want to ascertain is not the expectation period (so dear to many doctors), but the mortality tables for different classes of impaired lives.

My appeal did not meet with a response, which was not to be wondered at, for it came from a junior and inexperienced member of the Association. But the idea was too fascinating to forget; and, not succeeding in getting the Life Assurance Medical Officers’ Association to tackle the difficulties of the labyrinth, I proceeded in the happy confidence of youth and inexperience, to

explore it alone. I am sanguine enough to hope that I have found an Ariadne clue; a clue which is, I think, thoroughly workable, though it will need to be perfected for practical use by the labour of wiser heads than my own.

Before briefly describing it to you, permit me to state the desiderata which any workable scheme must meet.

First and foremost, it must be reasonably easy of comprehension, and must lend itself to ready memorising of its main features, and of its most frequently used portions.

Secondly, it must possess a concise and legible notation, so that once a case has been classified it can be briefly docketed in such a way as to be readily picked out at any subsequent time. If these two requirements are fully met, it insures that a minimum of time will be spent in operating the system.

Thirdly, it must allow ample provision for the increase of our knowledge. Increased knowledge will necessitate the creation of new classes, and the subdivision of existing ones to a greater degree, or even along new lines. And it must be possible to do this without any wholesale recasting of the system.

Fourthly, while it must be up to the limit of our knowledge, it must recognise the fact that the outer fringe of our knowledge is not always of much practical value. To take an instance of what I mean: we are able at present to say definitely that certain pleurisies are tuberculous, and that certain others are not, but we cannot definitely place every pleurisy in one or other of these categories. While we must have a pigeon-hole for those which can be definitely included in the tuberculous class, and one for those which can be as definitely excluded, we must at present have one also (whose contents will be more than those of both the others put together) for pleurisies which we cannot definitely classify. And it must be easy to throw these three classes into one, with a view of getting out a reliable average mortality, which any company might use as a basis, loading more heavily (or declining if it saw fit) the undoubtedly tuberculous case, and granting more favourable terms to the case clear of all suspicion of tubercle.

Furthermore, there will ever be two great mental temperaments, known in the botanical world by the expressive names of "lumpers" and "splitters", and the classification should be such a one that a man of either temperament could use it, the "lumper" not being forced to split up his cases into endless varieties, nor the "splitter" compelled to place together cases which

he deems to fall into entirely different categories of risk. And if in any office (or group of offices making a common investigation) an Amurath does *not* an Amurath succeed, but a peaceful revolution takes place, then the "lumper" should be able, with the minimum of trouble, to neutralize the excessive splitting of his predecessor, or the "splitter" to parcel out what his forerunner had lumped together.

This is no mean programme. A scheme which passably meets the four requirements thus laid down will, I dare to say, find no actuary, and few medical men engaged in insurance work, to question its importance.

But what of its practicability? Are you inclined to think that I have sketched an outline too large to fill in? I hope to show you that this is not so. But I claim little credit, for the scheme which fills it is not mine, but is actually adopted in its entirety, and merely turned to a new purpose.

Two things I must say of it before entering into particulars. First, *all* the details are purely tentative; it is nothing but a first rough draft, whose faults are manifest. It is the *method* which I wish to commend to your consideration, the *details* would have to be most thoughtfully considered by a select body of experienced men. Secondly, it is no mere theoretic structure. For two whole years I have used it, imperfect as it is, and have docketed some 4,000 cases with it. I have proved its usefulness by the great rapidity with which it enables one to elaborate statistics on any given matter, thus saving in one single investigation a large proportion of the time spent in its original application. For instance, I recently investigated 3,000 applications in regard to family history of cancer, and by this method was enabled to ascertain in slightly over an hour and a half the precise incidence of cancer among the relatives of these 3,000 cases. I may also claim that it requires a minimum of time: after a short use of it, it becomes possible to docket cases once and for all in the average time of two-thirds of a minute to each (549 cases in 367 minutes), even if one has to take up the record specially for the purpose: whereas, of course, if the docketing were done at the time when the case is under the consideration of the medical director, and all its features are in his mind's eye, the time used would be even shorter. (It must also be remembered that I have intentionally been using the system with its fullest detail, so that a "lumper" would need even less expenditure of time in operating it.)

Those of you who are interested in library classification and cataloguing will immediately admit that my claims are justified when I say that the scheme which I advocate is merely an application of Melville Dewey's great plan of "Decimal Classification." To others, however, this conveys no meaning: and for them I must enter into details. Some of these details I cannot better give than in the words of the author of the system, modified (if necessary) so as to apply to the new use to which I suggest putting it.

The essential feature of the system is that it uses the Arabic numerals as indicators of classes, not using names at all; but it so uses the numerals that their arrangement recalls the subject. This is effected by dividing the matter to be classified (in the present instance the different sorts of impairments which may occur) into ten main classes. The ten main classes which I have been using are as follows: (Pardon my emphasizing again, before giving the detail, that the details are merely accidental and experimental, and must be subject, before any satisfactory standard could be agreed on, to the most searching criticism, and probably to many radical alterations; the important matter is the principle of the scheme, which can, however, only be elucidated by taking details as examples.)

- 000 Physique and Development.
- 100 Family Longevity.
- 200 Diatheses and Zymoses.
- 300 Tuberculosis.
- 400 Circulatory and Urinary.
- 500 Respiratory.
- 600 Alimentary.
- 700 Nervous System.
- 800 Surgical.
- 900 Miscellaneous.

It will be evident to all that this is not a scientific classification, for the last item at least has no scientific basis; and to the doctor's eye there are errors from a scientific point of view throughout. But this is in accord with the spirit of the system. "The impossibility of making a satisfactory classification of all knowledge has been appreciated from the first, and theoretical harmony and exactness have been repeatedly sacrificed to practical requirements."

To give a further idea of the system we will take a single example of its smaller sub-divisions, the decade numbers, and the

unit numbers. The decade numbers are used (as a rule) for individual diseases or closely allied groups: the unit numbers for details in regard to these diseases. This can be best understood by taking an example. Thus the decades under the century 500 (Respiratory Diseases) are as follows:

- 510 Pneumonia.
- 520 Pleurisy.
- 530 Bronchitis.
- 540 Asthma.
- 550 } [Blank].
- 560 }
- 570 }
- 580 Naso-pharynx.
- 590 Miscellaneous Respiratory.

Then 530 is further subdivided in unit numbers.

- 531 Family History. Subdivide thus:
  - 1 One grandparent.
  - 2 One collateral.
  - 3 One parent.
  - 4 Two collaterals.
  - 5 One collateral and one parent.
  - 6 Both parents.
  - 7 Other "two's."
  - 8 More than two cases.
  - 9 Doubtful cases.

- 532 One attack. Subdivide thus:
  - 1 Less than five years ago.
  - 2 Five to nine years.
  - 3 Ten to fourteen years.
  - 4 Fifteen to nineteen years.
  - 5 Twenty years or more.

- 533 Recurrent attacks.

- 1 "Winter cough."

- 534 Chronic Bronchitis.

- 535 Emphysema.

- 536 Present (rhonchi).

- 9 Harsh respiratory murmur (general).

- 537 } [Blank].
- 538 }
- 539 }

It will at once be understood that many cases will have two or more numbers: thus, a man who in addition to a family

history of bronchitis (in mother's case) had also had an attack himself six years ago, would be docketed 531·3 and 532·2. It is perhaps as well to give an instance of a case with a number of flaws—in fact one so bad that it would be an impossible risk for acceptance.

*Family History.*—Father died, *æt.* 53; apoplexy. Father's father died, *æt.* 60; gout.

*Personal History.*—Has had three slight attacks of gout in toe; the last one about 18 months ago. Has occasional heartburn and acidity.

*Present Condition.*—Weight 12 st. 12 lbs.; Height 5 ft. 5 in.; Chest 33 in., 32 in.; Abdomen 34 in.; Arterial tension somewhat increased, some accentuation of the Aortic second sound; slight Albuminuria (in two specimens): S.G. 1011, 1007.

This case would have a large series of numbers, as follows:—034, 053, 221·13, 224·1, 446·2, 463·92, 614, 721·3.

The meaning of these numbers is as follows:—

034: More than 25 per-cent over weight, 030; with abdomen more than expanded chest, 034.

053: Chest expansion less than 2 inches.

221·13: Family History of Gout, 221; grandparent certain, parent doubtful, 221·13.

224·1: Personal History of Gout, two or more attacks, 224; last attack less than 5 years ago, 224·1.

446·2: Pulse abnormalities, 440; high tension, 446; with accentuated second sound, 446·2.

463·92: Albuminuria, 460; slight but constant, 463; not known to have existed before, 463·9; with S.G. below 1012, 462·92.

614: Dyspepsia, 610; recurrent 614.

721·3: Apoplexy, 720; family history, 721; one parent, 721·3.

This seems very elaborate to read, but is most simple once the rudiments of the system have been mastered; and after but little practice this case could have been fully docketed with the eight numbers given above in well under two minutes. Whatever particular flaw was being investigated (whether overweight, albuminuria, gout, dyspepsia, or any of the others) this case would then be included in the investigation; and of course, in dividing either of these classes further, the other numbers would

be useful ; thus, if investigating albuminuria cases, this would be at once put in a most important sub-class, albuminuria in the gouty ; and so on.

It will also be seen that once a case is docketed, a junior clerk can be employed at a minimum expense to sort out the material for any investigation, being told simply what numbers he is to take out for the doctor or actuary.

“ Wherever practicable, heads have been so arranged that each “ subject is preceded and followed by the most nearly allied “ subjects, and thus added convenience is secured.” Thus 220 Gout comes between 210 Rheumatism and 230 Diabetes (or Glycosuria), to both of which it is allied ; so also 510 Pneumonia is followed by 520 Pleurisy ; and 530 Bronchitis by 540 Asthma.

The system has been made easy of recollection by using the same figures with the same meanings in many cases. Thus a final “ 1 ” almost always means Family History ; for example, to take the classes already referred to, 211 is Family History of Rheumatism, 221 of Gout, 231 of Diabetes, 511 of Pneumonia, 521 of Pleurisy, and so on. For those who care to subdivide further, a set of decimals is used to indicate the particular degree of consanguinity of the tainted relatives to the applicant, and thus the strength of the taint. (This set of decimals is, of course, uniform for all family histories.) Similarly, in applicants where serious disease has occurred in the past, and where the degree of impairment may be affected by the period which has elapsed since its occurrence, a simple arrangement of decimals allows this period to be recorded.

Decimals are often used for matters which many men may consider of minor importance, but which some may deem worth separating into different classes. Thus urines with sugar or albumen are divided according to whether the specific gravity is normal or abnormal (*i.e.*, high in the case of sugar, low in that of albumen).

While Dewey's original system utilizes every one of the numbers from 000 to 999 (in addition to a very elaborate, though unequally distributed, subdivision by means of decimals) I have not found it necessary to use the whole of these numbers. And I have not tried to fill up the blanks, for the numbers thus left vacant will find their use when additions or alterations are required by the progress of medical science, by enabling these to be made without recasting the whole classification. There are

even some of the "decade" numbers vacant besides very many of the "unit" numbers.

One matter may be referred to, which really belongs more to the sphere of the committee of experts whom I hope some day to see at work polishing and perfecting this scheme. This is the question—difficult at first sight—how much detail is desirable or permissible. I say difficult at first sight, for I believe it can be solved in one way only, by elaborating the fullest detail. For adopting this solution in my draft I had three reasons: first that I desired to find the weak points of the scheme, and to use it at the greatest disadvantage as to expenditure of time and trouble, to see whether it would break down under severe tests. Second, that my own mental temperament leans towards subdivision. Third, that one can never tell when an apparently unimportant class may become of great interest. Of this latter reason, let me give you an apposite illustration. When I made out my draft, if there was one point which above all others seemed to me to be a needless refinement it was allotting a section to Infectious Diseases, and differentiating the more important of them. Thus we have 281 Influenza, 282 Small-pox, 283 Scarlet Fever, 284 Diphtheria, 285 Typhoid, and so on. But during the two years which have elapsed, a suggestion has been made, on high authority, that typhoid fever predisposes to that class of arterial degenerations which, coming on in middle life from 45 or 50 onwards, prove so disastrous to insurance companies. Now, though it is on high authority, I am somewhat inclined to doubt this; but were this classification in general use, the suggestion, which is most important if true (not in the way of loading, but of putting examiners specially on their guard as to the state of the arteries in such cases) could have been definitely proved or disproved in six months by a comparatively inexpensive investigation of all cases docketed by the various companies as "285", to see whether there was an excessive mortality from arteriosclerosis and allied complaints.

The first of these reasons for using much detail applies to myself and to the preliminary investigation only; the second appeals to those who have a mental temperament similar to my own; but the third reason must appeal to all alike; and for that reason alone one strongly advocates wealth of detail. (The detail need not in the least confuse the use of the system, for a judicious employment of large and small print—if ever it reaches the stage of being printed—would secure entire clearness. This

has been most successfully done in Dewey's original classification, containing some 130 pages of detail.)

It may be objected that from many examination forms in use the details cannot be obtained; and I know that the present tendency in British circles is towards a simplification of the examination forms; but Britain is the exception, for the opinion on the Continent and in America, though certainly not unanimous, is strongly on the side of a detailed examination form. Companies where the detail is insufficient can always omit the decimals, or even treat (say) class 520 Pleurisy as comprising all varieties of Pleurisy (included under 522 to 527 in my classification, 528 and 529 being blank numbers). The numbers ending with 0 are kept free for precisely this purpose, all cases where details are deficient being classed under the general head.

This process, like many excellent processes, is far and away easier to carry out than to describe; I only ask that what I believe to be a thoroughly practical process may not be misjudged by you because of the difficulty of explaining it. I should like to conclude with a quotation from Dewey (for whose practical genius I have a very high admiration) in connection with one of the main objections that theoretical critics have made to his scheme.

"Theoretically, the division of every subject into just ten heads is absurd. Practically, it is desirable that classification be as minute as possible, without use of added figures; and the decimal principle, on which our scheme hinges, allows ten divisions as readily as a less number. The principle has proved wholly satisfactory in practice, though apparently destroying proper co-ordination in some places. The difficulty in such cases is entirely obviated by the use of another figure, giving nine sub-sections to any subject of sufficient importance to warrant closer classification. . . . We have not sacrificed utility in order to force subjects on the decimal procrustean bed. Decimals have been used as servants, not as masters. When subjects have been separated or combined into just ten heads, it has been from no necessity of the subject, but because it seemed the most useful way, all things considered. . . . There has been a perverse misapprehension of this feature, and critics oftenest stumble over 'procrustean ten.' In fact this is an element of usefulness. A railroad also has the fault that it is procrustean in its path and its times. It cannot come to your

“door, nor wait your convenience, as did the stage coach or  
 “carriage; it cannot go to the fields for its loads of produce;  
 “it cannot turn out of the way for obstacles; and it is simply  
 “because it is so procrustean that it can do its work so much  
 “better, and quicker, and cheaper. The parallel could fairly be  
 “extended to many other cases, but any thoughtful mind will  
 “recognize that the economy and ease of working of the decimal  
 “system are dependent on its being procrustean.”

We are all convinced of the importance of a standard classification of impaired lives; have I been able to give you a sufficient glimpse of its practicability to make you desire to look further into the matter? If so, I venture to say, I shall have justified your courtesy in permitting an individual entirely untrained in actuarial matters to occupy the time of this learned body.

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#### ABSTRACT OF THE DISCUSSION.

Mr. E. A. RUSHER, in opening the discussion, said that the Institute ought to be congratulated that Dr. Carruthers had brought before it the subject of impaired lives, which was of daily practical importance to actuaries, and yet which had received but scant notice at the Institute. In dealing with this subject, the actuary, perhaps, did not have quite the same object in view as the medical officer. He was concerned mainly, if not entirely, with the financial result of admitting lives subject to other than normal rates of mortality. Except as bearing upon that result, and as enabling him to estimate the susceptibility of a given life to such extra mortality, it might also be said that he did not care much whether the extra mortality was caused by hereditary predisposition, unfavourable environment, or by some accidental cause. What concerned him more particularly was the incidence of the impairment, that was to say, the way in which a number of lives whose impairment might be considered fairly homogeneous were subjected to an extra rate of mortality, at what age group or groups that extra mortality first began to show itself, and through what age period it existed. In short, actuaries required the curve of mortality, whence they could deduce the premium actually required for lives subject to the special risk. The doctor, on the other hand, had in mind to a large extent the resulting benefits to his profession in the alleviation, and it might even be the elimination, of causes that tended to increase the death roll. He would thus seek for some light to be thrown on the causes themselves, and on the period of life at which they exerted their most powerful influence. It probably was, however, the case that the effect upon the future mortality, and consequently the premium chargeable, was quite different in each of the three cases suggested. Thus, where the susceptibility arose from hereditary causes, it might manifest itself in much increased mortality rates at the younger ages, whilst that from environment might either show the same incidence

or might not exert an effect till later on in life; again, that from accidental causes might be fairly well spread over a long period of life. Thus, though from different standpoints, the doctor and the actuary came very much to the same general principle, that it was necessary to investigate at least the main classes of causes of impairment, and if possible some of the major portions of the sub-classes.

The paper might be said to consist of: (1) A general plea for a combination of the experience of the various offices on under-average lives, and (2) The particular adoption of the Melville Dewey scheme of Notation for classification. Taking the latter first, he would like to premise his observations by saying it was always easy to raise objections to a particular detail of any given scheme, and he hoped that Dr. Carruthers would not think it at all discourteous or wanting in due appreciation of the power of the Melville Dewey scheme if, for the particular purpose in hand, he did not quite follow him in his glowing eulogy, but rather put in a plea against minute sub-division in gathering material for such an investigation as the author contemplated. In the old Institute Experience, facts which related to impaired lives were tabulated in one heterogeneous mass, without any distinction whatever of the different causes for which they had been classified as impaired. Though the figures were sufficiently interesting to repay a careful analysis, it was evident that the absence of classification made them of very little practical use; but he could not help feeling that the sub-divisions suggested by Dr. Carruthers went too far in the opposite direction. The number of lives under observation being very limited, it would seem to serve no good purpose to adopt a system of classification so minute that it was quite conceivable that in some of the classes only one life might pass under observation, and they might with confidence look for a much more satisfactory result if they confined themselves to a few main groupings; although even then the facts might prove too few to enable them to base results upon them with any degree of confidence. Their American colleagues issued a short time ago their "Specialized Mortality Experience", in which the lives were divided up into 98 classes. Although they dealt with the whole body of assured lives, and not with that small fraction of them included under the term of "Impaired lives", it was obvious that in many of the classes the general results were practically valueless owing to the paucity of data. An extreme instance of that difficulty had come under his notice within the past few days, a brother actuary having informed him that upon making an investigation into the experience of his own office, having over 13,000 policies in force, he found that for the past six years he had an average of not more than 45 cases of impaired lives of all classes. Mr. Manly's experience, valuable as it was, dealt only with 945 cases, although Mr. Manly did not appear to have limited the investigation to impaired lives, but on the contrary, stated explicitly that only about half a dozen were rated up, and that they were mostly recent cases. It had been his (the speaker's) privilege recently to initiate an investigation into the risks on impaired lives in a large assurance company. In consultation with the medical officer, it was decided to limit the classification to 14 main heads, and 64 sub-

heads. The work was at present only in its initial stages, but it was already evident that even that classification was too minute, and that many of the sub-heads would have to be combined to obtain useful results. He would suggest to the author that he was much more likely to attain the end he had in view, and to meet with the sympathetic support and co-operation of the actuarial profession, if he confined his excellent plan within narrower limits. In the second place, he was not at all convinced that it would be advantageous to adopt Mr. Melville Dewey's system of numerical classification. The facts would, of course, be brought out in tabular form, and consist of large numbers of figures; and it seemed to him that it might save some confusion, and possibly be found preferable, to employ the letters of the alphabet for the main headings, with suffixes for the sub-classifications. The alphabetical plan was that which had been adopted in the experience to which he had referred. Thus, class *a* stood for phthisical taints, the sub-headings being  $a_1$ , "Father only died of phthisis",  $a_2$ , "Mother only died of phthisis", and so on. Class *b* similarly dealt with rheumatic fever and lesions of the circulatory system.

Turning to the other object of the paper, the plea for a combination of the experience of the various offices on impaired lives, that was a matter on which one could express the fullest and most unqualified approval. To have an experience of the kind would indeed be a boon and a blessing to the actuary, who at present had nothing but the most empirical means of even approximately gauging the extent to which a life should be rated up. There was at present the utmost diversity of practice in that respect. One office would rate a man up so many years and charge the premium accordingly, irrespective of the period at which the extra risk might become operative, or of the class of assurance. Another would take the same man at ordinary rates for an endowment assurance, whilst declining him altogether for a whole-life policy; and yet another would charge a diminishing debt against the sum assured. Even with the small knowledge that they already had, they were not always consistent, some offices dealing with all impaired lives on a similar plan, say, that of charging the premium for a higher age; whereas one would expect that each office would at least divide its impaired lives into classes according to the way in which they might be generally expected to be subject to extra mortality, adopting, say, the diminishing debt for entrants at young ages with a family history of consumption, and the extra premium for those that might be expected to have a tendency to gout. That confusion was due entirely to the absence of reliable information, one had almost said of any information at all, and it would be a great step forward if they could obtain an experience divided into a few main classes, possibly with sub-divisions. As suggested by Mr. Burn, in a valuable paper read last year before the Insurance Institute of Toronto, if there were such an experience the medical officers would inform the actuaries which class would most nearly approximate to their ideas of an impaired life that came before them, and from the experience tables the actuary could estimate the premium necessary to cover the risk. As already indicated, a start had been made

in that direction by one large company, though a long time must elapse, possibly years, before the results of such an elaborate investigation could be worked out to a practical conclusion. It would add materially to the value of the results if other actuaries would likewise obtain experience from the records at their disposal. It might even be suggested that now that the Institute had practically completed its laborious researches into the rates of mortality amongst healthy assured lives, it would not be an inappropriate task for them to enter upon a similar research into the comparatively untrodden ground of impaired lives.

Dr. LIGHT thought that both actuaries and doctors must feel grateful to the author for his valuable paper on so important a subject, which especially called for the co-operation of the actuary and the doctor. The Melville Dewey scheme of notation and classification of under-average lives seemed to him a most excellent method if elaborate detail were needed, but from his experience in the classification of those lives he could confidently say that minute sub-divisions were not only unnecessary, but they were impossible for the purpose of an investigation such as the author suggested. What was required was a simpler system without elaboration, or the Melville Dewey scheme of notation much simplified. The one he had adopted, although by no means perfect, was that described by Mr. Rusher, in which the letters of the alphabet represented the main headings and the suffixes the classifications. It was simple, easily memorized, and rapidly worked. He considered that more than one letter on the subject of a heading would be liable to much confusion. For instance, there were five recognized reasons for rating up a life; (1) blemished family history; (2) blemished personal history; (3) distinct personal defects; (4) personal conditions of doubtful medical significance; (5) unfavourable conditions of life. He thought the great majority of those cases would fall under one working heading—some would fall under two, some would come under three—but in those compound cases the one heading would be of greater importance as compared with the others, and be the principal reason for rating up the life. He would suggest, to prevent confusion, that such a life be classed under its most important heading, and any less important flaws worthy of record entered somewhere else than under that heading. With regard to the first heading of blemished family history, he would like to point out that, apart from consumption and cancer, the other headings were of minor importance, and would not require any sub-divisions, such as those given by the author under the heading of family history of bronchitis. As far as the result of his own investigations went, it seemed to him that all lives rated up for personal blemish—for instance, bronchitis—would have to be placed under their main heading, irrespective of family history and other minor flaws, in order to get sufficient data to produce reliable results. For the same reason it would be found impracticable to split up the data for pleurisy; but even if it were practicable, he failed to see where the information was forthcoming to enable such a division to be made. What they must hope to obtain were reliable average mortality tables for the different classes

of impaired lives. The present mode of adjusting advances for impaired lives was highly unsatisfactory, and it was hoped that by the combined experience of the various offices a more scientific method might be obtained.

Mr. S. G. WARNER was sure that, in the first place, they all very heartily welcomed the author, and looked upon it as an exceedingly pleasant and helpful incident that a member of the medical profession, with which the actuarial profession worked so closely, and to which it owed so much, should come and assist them in their deliberations on so important a subject. He suggested, in the second place, that the members might congratulate themselves on the fact that a paper of the kind which had been read was brought before them in the Spring, when, he believed (according to philosophers) human vitality was at its highest; otherwise, the list of diseases brought before them, and the unhappy experiences of the gentlemen selected as an illustration of the working of the scheme, might have had a distinctly depressing effect upon their spirits. The ideal of the paper was obviously that extra rating should be reduced to an exact science, which it was very far from being at the present time, and that actuaries should be able, scientifically, to estimate the mortality of each class of impaired lives. He did not profess to be in any way an expert upon the technique of a paper like the one under discussion. The particular method of classification suggested seemed, on the assumptions made, to be a very good and clear one, and he did not think he could profitably say anything further about it, except to concur in a general remark already made in regard to its excess of detail. He was afraid it was a counsel of perfection, and something which was almost hopeless, that actuaries should ever look forward to having so vast an amount of facts as would enable them to form sound scientific conclusions in regard to mortality on so minutely sub-divided a classification as that given by the author. It seemed to him that if anything of the sort were attempted in any scheme which approached in elaboration the details given in the paper, the investigation must necessarily, before anything like an adequate body of facts could be obtained, last so long that in the meantime social and medical conditions would substantially alter, so that many of the facts included in the earlier part of the investigation, and mixed with those which came at a later period, would be of differing values, and would go far to deprive the results of scientific value. It further appeared to him that many of the somewhat minute flaws provided for by the author's scheme of analysis would not be such as to bring a life into the class of impaired lives at all. It seemed to him, for instance, that the death of one grand-parent from respiratory disease would not, in the opinion of most of them, cause that life to be brought into the class of impaired lives; it would take its place with the general average lives that came before an office, and would be accepted at ordinary rates. Nevertheless, a class was provided in the paper for those whose only flaw appeared to be the loss of one grand-parent by respiratory disease. Further, there seemed to him to be a somewhat serious and fundamental difficulty when impaired lives were regarded strictly from the statistical point of view. It seemed to him that the difference, for such a purpose, between

those lives and the average lives which were accepted at ordinary rates was not altogether one of degree; it was almost a difference of kind; because if reliable mortality tables were to be obtained founded upon statistical information of that sort, followed out into elaborate detail, it would be found that the circumstances of almost each individual case differed widely. Variations in social environment, the medical assistance it was possible to procure, and similar features, made such wide distinctive differences as to upset the average, and rendered it very unlikely that reliable figures could be obtained enabling them to fix, as he supposed was the intention, scientific premiums for impaired lives on such a classification as the author's. Actuaries had to admit that the system at present in force was a very rough and ready one, but it was difficult to see what, for many years to come, was to take its place. After all, important as the subject was, it was a consolation to remember that the backbone of life assurance companies' business did not consist of impaired lives, but of lives which were considered to be in average health; and while the Institute welcomed any attempt to place more effectively at the disposal of its members the resources of science, enabling them exactly to estimate and precisely to deal with this smaller class, he was afraid, for the reasons he had ventured to suggest, that such a desirable consummation could only come at a distant date. Of course that need not in the least interfere with their gratitude to the author for bringing the problem before them, and for his heroic attempt at its solution; nor with their appreciation of the skill and ingenuity of that attempt.

The PRESIDENT, in proposing a hearty vote of thanks to the author for his paper, said he thought there was undoubtedly good work yet to be done in the direction indicated; but the classification to be attempted was very largely one which their medical friends must themselves determine. He would only ask the author—who he hoped would, with his colleagues, pursue the subject still further—to recollect that what actuaries and physicians should jointly aim at was something of which practical use could be made. For that purpose he thought any classification which was to be of everyday use must not be too elaborate. He did not wish, however, to discourage the author from the large amount of work which he appeared to be willing to undertake; and when he had elaborated something further which he considered a practical scheme, he thought the Life Offices would not withhold from him their collaboration in the direction of furnishing material.

The vote of thanks to Dr. Carruthers was then put and carried with acclamation.

Dr. CARRUTHERS, in reply, thanked the members most cordially for the very kind reception they had given to his somewhat crude paper. If they felt any gratitude to him for bringing the subject forward, he thought that this should be extended also to his valued colleague, Mr. Allin, on whose suggestion he brought the paper before the Institute, and who had given him valued advice at almost every step of the work. He was afraid, however, he had not made one point clear. The criticisms that

had been raised were all justified on two assumptions. With regard to impaired lives, his definition would not be the definition that seemed to be adopted by the members of the Institute. It seemed to him the speakers had supposed that the paper only had to do with rated lives. But it had to do with a much wider class than that. Mr. Warner had referred to the question of one grand-parent suffering from consumption. Of course that in itself was hardly enough to make an impaired life, certainly not to make a rated life, but it might have considerable weight in the general consideration of the case. He believed most doctors present would say that in the case of an applicant who was a little under weight, who had a poor chest expansion, and had a past pneumonia, even a grand-parent dying of consumption, would very likely turn the scale heavily against him. Doctors ought to be able to record every deficiency that occurred in an individual life. In the same way Dr. Light had stated that it was necessary to use the principal heading mainly. He tried to do that at first; it was his ideal; but he would like Dr. Light to tell him in a case where there was both albuminuria and gout which he would consider the principal heading. They might want to consider it among the gouty cases, or they might want to consider it among the albuminuric cases; and that was the reason why he laid aside the method which Dr. Light had adopted of principal headings without subordinate headings. The second matter that seemed to him to have been not clearly understood was that it was never in his mind that an actuarial investigation could possibly be made, at any rate at present, with all the minute sub-divisions he had suggested; he had been looking very far into the future. He tried to make it quite clear that, at the present time, a great many of the classes would have to be combined. Mr. Rusher, after referring to the smallness of the classes and the classification, answered himself by saying that, even with the larger classes his office were at present working with, they found they had to group them together. To his mind the principal beauty of the system he advocated was the absolute ease with which small classes that could not be dealt with separately might be grouped together. He assured the members that it was very little more trouble to docket a case with the smaller sub-divisions than it was with the larger ones. If the classes were not sub-divided originally, and it was afterwards found that the advances of science, or the increase in the number of lives at risk, would enable the actuary to investigate the matter with more minuteness afterwards, the whole work had to be done again from the beginning; whereas if they were sub-divided originally they could easily be combined for a collective investigation, and if science progressed further afterwards the sub-divisions were there already docketed, and could be used without further expense, either of money or of time. He was rather amused to find that, in the only instance Mr. Rusher gave of his classification, he had adopted more sub-divisions than he (the author) had. Mr. Rusher distinguished between a father and a mother dying of consumption, whereas he (Dr. Carruthers) did not distinguish between the two parents; they both came under class 313 in his classification. Mr. Warner admitted that the present system of dealing with impaired lives

was an unscientific one. His difficulty in dealing with the question throughout had been that unless the doctors made a start in the way of classification nothing could ever take its place. If the Institute of Actuaries and the Life Assurance Medical Officers' Association could see their way to take up the question of classification, not necessarily at all along the Dewey lines, but possibly along the lines used by Mr. Rusher and Dr. Light, he thought it would be a great step in advance.

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To the Library  
of the Royal College of Surgeons of England  
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